

# SEQUENCE LISTING

<110> Petrini, John H.J.  
Morgan, William Franklin  
Maser, Richard Scott  
Carney, James Patrick

<120> DNA Encoding A DNA Repair Protein

<130> 800.019US1

<140> US 09/067,641

<141> 1998-04-27

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<170> FastSEQ for Windows Version 3.0

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| ttctttttcca | ttatgctgta  | gtcttaccta | aactctgggtg | atccaaacaa  | aatggcttca  | 2820 |
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| gctgcttgca | ggtggaactc | cagctgcaag | ggagttaggg  | aaatgaaggt | ctttttttaa | 3420 |
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| Met | Trp | Lys | Leu | Leu | Pro | Ala | Ala | Gly | Pro | Ala | Gly | Gly | Glu | Pro | Tyr |
| 1   |     |     |     | 5   |     |     |     | 10  |     |     |     |     | 15  |     |     |
| Arg | Leu | Leu | Thr | Gly | Val | Glu | Tyr | Val | Val | Gly | Arg | Lys | Asn | Cys | Ala |
|     |     |     |     | 20  |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Ile | Leu | Ile | Glu | Asn | Asp | Gln | Ser | Ile | Ser | Arg | Asn | His | Ala | Val | Leu |
|     |     |     |     | 35  |     |     |     | 40  |     |     |     |     | 45  |     |     |
| Thr | Ala | Asn | Phe | Ser | Val | Thr | Asn | Leu | Ser | Gln | Thr | Asp | Glu | Ile | Pro |
|     |     |     |     | 50  |     |     |     | 55  |     |     |     |     | 60  |     |     |
| Val | Leu | Thr | Leu | Lys | Asp | Asn | Ser | Lys | Tyr | Gly | Thr | Phe | Val | Asn | Glu |
| 65  |     |     |     | 70  |     |     |     | 75  |     |     |     |     | 80  |     |     |
| Glu | Lys | Met | Gln | Asn | Gly | Phe | Ser | Arg | Thr | Leu | Lys | Ser | Gly | Asp | Gly |

|   |     |     |     |     |     |
|---|-----|-----|-----|-----|-----|
|   | 85  |     | 90  |     | 95  |
| Ile Thr Phe Gly Val Phe Gly Ser Lys Phe Arg Ile Glu Tyr Glu Pro |     |     |     |     |     |
|   | 100 |     | 105 |     | 110 |
| Leu Val Ala Cys Ser Ser Cys Leu Asp Val Ser Gly Lys Thr Ala Leu |     |     |     |     |     |
|   | 115 |     | 120 |     | 125 |
| Asn Gln Ala Ile Leu Gln Leu Gly Gly Phe Thr Val Asn Asn Trp Thr |     |     |     |     |     |
|   | 130 |     | 135 |     | 140 |
| Glu Glu Cys Thr His Leu Val Met Val Ser Val Lys Val Thr Ile Lys |     |     |     |     |     |
| 145   |     | 150 |     | 155 | 160 |
| Thr Ile Cys Ala Leu Ile Cys Gly Arg Pro Ile Val Lys Pro Glu Tyr |     |     |     |     |     |
|   | 165 |     | 170 |     | 175 |
| Phe Thr Glu Phe Leu Lys Ala Val Gln Ser Lys Lys Gln Pro Pro Gln |     |     |     |     |     |
|   | 180 |     | 185 |     | 190 |
| Ile Glu Ser Phe Tyr Pro Pro Leu Asp Glu Pro Ser Ile Gly Ser Lys |     |     |     |     |     |
|   | 195 |     | 200 |     | 205 |
| Asn Val Asp Leu Ser Gly Arg Gln Glu Arg Lys Gln Ile Phe Lys Gly |     |     |     |     |     |
|   | 210 |     | 215 |     | 220 |
| Lys Thr Phe Ile Phe Leu Asn Ala Lys Gln His Lys Lys Leu Ser Ser |     |     |     |     |     |
| 225   |     | 230 |     | 235 | 240 |
| Ala Val Val Phe Gly Gly Gly Glu Ala Arg Leu Ile Thr Glu Glu Asn |     |     |     |     |     |
|   | 245 |     | 250 |     | 255 |
| Glu Glu Glu His Asn Phe Phe Leu Ala Pro Gly Thr Cys Val Val Asp |     |     |     |     |     |
|   | 260 |     | 265 |     | 270 |
| Thr Gly Ile Thr Asn Ser Gln Thr Leu Ile Pro Asp Cys Gln Lys Lys |     |     |     |     |     |
|   | 275 |     | 280 |     | 285 |
| Trp Ile Gln Ser Ile Met Asp Met Leu Gln Arg Gln Gly Leu Arg Pro |     |     |     |     |     |
|   | 290 |     | 295 |     | 300 |
| Ile Pro Glu Ala Glu Ile Gly Leu Ala Val Ile Phe Met Thr Thr Lys |     |     |     |     |     |
| 305   |     | 310 |     | 315 | 320 |
| Asn Tyr Cys Asp Pro Gln Gly His Pro Ser Thr Gly Leu Lys Thr Thr |     |     |     |     |     |
|   | 325 |     | 330 |     | 335 |
| Thr Pro Gly Pro Ser Leu Ser Gln Gly Val Ser Val Asp Glu Lys Leu |     |     |     |     |     |
|   | 340 |     | 345 |     | 350 |
| Met Pro Ser Ala Pro Val Asn Thr Thr Thr Tyr Val Ala Asp Thr Glu |     |     |     |     |     |
|   | 355 |     | 360 |     | 365 |
| Ser Glu Gln Ala Asp Thr Trp Asp Leu Ser Glu Arg Pro Lys Glu Ile |     |     |     |     |     |
|   | 370 |     | 375 |     | 380 |
| Lys Val Ser Lys Met Glu Gln Lys Phe Arg Met Leu Ser Gln Asp Ala |     |     |     |     |     |
| 385   |     | 390 |     | 395 | 400 |

Pro Thr Val Lys Glu Ser Cys Lys Thr Ser Ser Asn Asn Asn Ser Met  
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 Val Ser Asn Thr Leu Ala Lys Met Arg Ile Pro Asn Tyr Gln Leu Ser  
 420 425 430  
 Pro Thr Lys Leu Pro Ser Ile Asn Lys Ser Lys Asp Arg Ala Ser Gln  
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 Gln Gln Gln Thr Asn Ser Ile Arg Asn Tyr Phe Gln Pro Ser Thr Lys  
 450 455 460  
 Lys Arg Glu Arg Asp Glu Glu Asn Gln Glu Met Ser Ser Cys Lys Ser  
 465 470 475 480  
 Ala Arg Ile Glu Thr Ser Cys Ser Leu Leu Glu Gln Thr Gln Pro Ala  
 485 490 495  
 Thr Pro Ser Leu Trp Lys Asn Lys Glu Gln His Leu Ser Glu Asn Glu  
 500 505 510  
 Pro Val Asp Thr Asn Ser Asp Asn Asn Leu Phe Thr Asp Thr Asp Leu  
 515 520 525  
 Lys Ser Ile Val Lys Asn Ser Ala Ser Lys Ser His Ala Ala Glu Lys  
 530 535 540  
 Leu Arg Ser Asn Lys Lys Arg Glu Met Asp Asp Val Ala Ile Glu Asp  
 545 550 555 560  
 Glu Val Leu Glu Gln Leu Phe Lys Asp Thr Lys Pro Glu Leu Glu Ile  
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 Asp Val Lys Val Gln Lys Gln Glu Glu Asp Val Asn Val Arg Lys Arg  
 580 585 590  
 Pro Arg Met Asp Ile Glu Thr Asn Asp Thr Phe Ser Asp Glu Ala Val  
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 Pro Glu Ser Ser Lys Ile Ser Gln Glu Asn Glu Ile Gly Lys Lys Arg  
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 Glu Leu Lys Glu Asp Ser Leu Trp Ser Ala Lys Glu Ile Ser Asn Asn  
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 Asp Lys Leu Gln Asp Asp Ser Glu Met Leu Pro Lys Lys Leu Leu Leu  
 645 650 655  
 Thr Glu Phe Arg Ser Leu Val Ile Lys Asn Ser Thr Ser Arg Asn Pro  
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 Ser Gly Ile Asn Asp Asp Tyr Gly Gln Leu Lys Asn Phe Lys Lys Phe  
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 Lys Lys Val Thr Tyr Pro Gly Ala Gly Lys Leu Pro His Ile Ile Gly  
 690 695 700  
 Gly Ser Asp Leu Ile Ala His His Ala Arg Lys Asn Thr Glu Leu Glu

705                      710                      715                      720  
 Glu Trp Leu Arg Gln Glu Met Glu Val Gln Asn Gln His Ala Lys Glu  
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                          20                      25                      30  
 Asn Leu Ser Gln Thr Asp Glu Ile Pro Val Leu Thr Leu Lys Asn Xaa  
                          35                      40                      45  
 Lys Tyr Gly Thr Phe Val Asn Glu Glu Lys Met Gln Asn Gly Phe Ser  
   50                      55                      60  
 Arg Thr Leu Lys Ser Val Asp Gly Ile Thr Phe Gly Val Phe Gly Ser  
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 Lys Phe Arg Ile Glu Tyr Glu  
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                   20                    25                    30  
 Ser Ser Asp Leu Lys His Ser Ser Leu Cys Leu Val Asn Lys Gly Lys  
                   35                    40                    45  
 Leu Thr Ser Leu Asn Lys Lys Phe Met Lys Val Gly Glu Thr Phe Thr  
                   50                    55                    60  
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                   20                    25                    30  
 Gly Asn Asp Thr Phe Val Thr Leu Asp Glu Ile Leu Arg Leu Ala Gln  
                   35                    40                    45  
 Glu Asn Glu Val Asp Phe Ile Leu Leu Gly Gly Asp Leu Phe His Glu  
                   50                    55                    60  
 Asn Lys Pro Ser Arg Lys Thr Leu His Thr Cys Leu Glu Leu Leu Arg  
 65                    70                    75                    80  
 Lys Tyr Cys Met Gly Asp Arg Pro Val Gln Phe Glu Ile Leu Ser Asp  
                   85                    90                    95

Gln Ser Val Asn Phe Gly Phe Ser Lys Phe Pro Trp Val Asn Tyr Gln  
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 Asp Gly Asn Leu Asn Ile Ser Ile Pro Val Phe Ser Ile His Gly Asn  
 115 120 125  
 His Asp Asp Pro Thr Gly Ala Asp Ala Leu Cys Ala Leu Asp Ile Leu  
 130 135 140  
 Ser Cys Ala Gly Phe Val Asn His Phe Gly Arg Ser Met Ser Val Glu  
 145 150 155 160  
 Lys Ile Asp Ile Ser Pro Val Leu Leu Gln Lys Gly Ser Thr Lys Ile  
 165 170 175  
 Ala Leu Tyr Gly Leu Gly Ser Ile Pro Asp Glu Arg Leu Tyr Arg Met  
 180 185 190  
 Phe Val Asn Lys Lys Val Thr Met Leu Arg Pro Lys Glu Asp Glu Asn  
 195 200 205  
 Ser Trp Phe Asn Leu Phe Val Ile His Gln Asn Arg Ser Lys His Gly  
 210 215 220  
 Ser Thr Asn Phe Ile Pro Glu Gln Phe Leu Asp Asp Phe Ile Asp Leu  
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 Val Ile Trp Gly His Glu His Glu Cys Lys Ile Ala Pro Thr Lys Asn  
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 260 265 270  
 Ser Leu Ser Pro Gly Glu Ala Val Lys Lys His Val Gly Leu Leu Arg  
 275 280 285  
 Ile Lys Gly Arg Lys Met Asn Met His Lys Ile Pro Leu His Thr Val  
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 340 345 350  
 Gly Asn Ser His Gln Pro Glu Lys Pro Leu Val Arg Leu Arg Val Asp  
 355 360 365  
 Tyr Ser Gly Gly Phe Glu Pro Phe Ser Val Leu Arg Phe Ser Gln Lys  
 370 375 380  
 Phe Val Asp Arg Val Ala Asn Pro Lys Asp Ile Ile His Phe Phe Arg  
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 His Arg Glu Gln Lys Glu Lys Thr Gly Glu Glu Ile Asn Phe Gly Lys



|   |     |     |     |     |     |
|---|-----|-----|-----|-----|-----|
|   | 405 |     | 410 |     | 415 |
| Leu Ile Thr Lys Pro Ser Glu Gly Thr Thr Leu Arg Val Glu Asp Leu |     |     |     |     |     |
|   | 420 |     | 425 |     | 430 |
| Val Lys Gln Tyr Phe Gln Thr Ala Glu Lys Asn Val Gln Leu Ser Leu |     |     |     |     |     |
|   | 435 |     | 440 |     | 445 |
| Leu Thr Glu Arg Gly Met Gly Glu Ala Val Gln Glu Phe Val Asp Lys |     |     |     |     |     |
|   | 450 |     | 455 |     | 460 |
| Glu Glu Lys Asp Ala Ile Glu Glu Leu Val Lys Tyr Gln Leu Glu Lys |     |     |     |     |     |
| 465   |     | 470 |     | 475 | 480 |
| Thr Gln Arg Phe Leu Lys Glu Arg His Ile Asp Ala Leu Glu Asp Lys |     |     |     |     |     |
|   | 485 |     | 490 |     | 495 |
| Ile Asp Glu Glu Val Arg Arg Phe Arg Glu Thr Arg Gln Lys Asn Thr |     |     |     |     |     |
|   | 500 |     | 505 |     | 510 |
| Asn Glu Glu Asp Asp Glu Val Arg Glu Ala Met Thr Arg Ala Arg Ala |     |     |     |     |     |
|   | 515 |     | 520 |     | 525 |
| Leu Arg Ser Gln Ser Glu Glu Ser Ala Ser Ala Phe Ser Ala Asp Asp |     |     |     |     |     |
| 530   |     | 535 |     | 540 |     |
| Leu Met Ser Ile Asp Leu Ala Glu Gln Met Ala Asn Asp Ser Asp Asp |     |     |     |     |     |
| 545   |     | 550 |     | 555 | 560 |
| Ser Ile Ser Ala Ala Thr Asn Lys Gly Arg Gly Arg Gly Arg Gly Arg |     |     |     |     |     |
|   | 565 |     | 570 |     | 575 |
| Arg Gly Gly Arg Gly Gln Asn Ser Ala Ser Arg Gly Gly Ser Gln Arg |     |     |     |     |     |
|   | 580 |     | 585 |     | 590 |
| Gly Arg Ala Phe Lys Ser Thr Arg Gln Gln Pro Ser Arg Asn Val Thr |     |     |     |     |     |
|   | 595 |     | 600 |     | 605 |
| Thr Lys Asn Tyr Ser Glu Val Ile Glu Val Asp Glu Ser Asp Val Glu |     |     |     |     |     |
| 610   |     | 615 |     | 620 |     |
| Glu Asp Ile Phe Pro Thr Thr Ser Lys Thr Asp Gln Arg Trp Ser Ser |     |     |     |     |     |
| 625   |     | 630 |     | 635 | 640 |
| Thr Ser Ser Ser Lys Ile Met Ser Gln Ser Gln Val Ser Lys Gly Val |     |     |     |     |     |
|   | 645 |     | 650 |     | 655 |
| Asp Phe Glu Ser Ser Glu Asp Asp Asp Asp Asp Pro Phe Met Asn Thr |     |     |     |     |     |
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<213> Homo sapiens

<400> 7

|             |             |             |            |             |            |      |
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| agtgggaatt  | tctagaattt  | ggaatcgagt  | gcattttctg | acatttgagt  | acagtaccca | 120  |
| ggggttcttg  | gagaagaacc  | tgggtcccaga | ggagcttgac | tgaccataaa  | aatgagtact | 180  |
| gcagatgcac  | ttgatgatga  | aaacacattt  | aaaatattag | ttgcaacaga  | tattcatctt | 240  |
| ggatttatgg  | agaaagatgc  | agccagagga  | aatgatacgt | ttgtaacact  | cgatgaaatt | 300  |
| ttaagacttg  | cccaggaaaa  | tgaagtggat  | tttattttgt | taggtggtga  | tctttttcat | 360  |
| gaaaataagc  | cctcaaggaa  | aacattacat  | acctgcctcg | agttattaag  | aaaatattgt | 420  |
| atgggtgatc  | ggcctgtcca  | gtttgaaatt  | ctcagtgatc | agtcagtcaa  | ctttggtttt | 480  |
| agtaagtttc  | catgggtgaa  | ctatcaagat  | ggcaacctca | acatttcaat  | tccagtgttt | 540  |
| agtattcatg  | gcaatcatga  | cgatcccaca  | ggggcagatg | cactttgtgc  | cttggacatt | 600  |
| ttaagttgtg  | ctggatttgt  | aaatcacttt  | ggacgttcaa | tgtctgtgga  | gaagatagac | 660  |
| attagtccgg  | ttttgcttca  | aaaaggaagc  | acaagattg  | cgctatatgg  | tttaggatcc | 720  |
| attccagatg  | aaaggctcta  | tcgaatgttt  | gtcaataaaa | aagtaacaat  | gttgagacca | 780  |
| aaggaagatg  | agaactcttg  | gtttaactta  | tttgtgattc | atcagaacag  | gagtaaacat | 840  |
| ggaagtacta  | acttcattcc  | agaacaattt  | ttggatgact | tcattgatct  | tgttatctgg | 900  |
| ggccatgaac  | atgagtgtaa  | aatagctcca  | acaaaaatg  | aacaacagct  | gttttatatc | 960  |
| tcacaacctg  | gaagctcagt  | ggttacttct  | ctttccccag | gagaagctgt  | aaagaaacat | 1020 |
| gttggtttgc  | tgcgtattaa  | agggaggaag  | atgaatatgc | ataaaattcc  | tcttcacaca | 1080 |
| gtgcggcagt  | ttttcatgga  | ggatattgtt  | ctagctaatc | atccagacat  | ttttaaccca | 1140 |
| gataatccta  | aagtaaccca  | agccatacaa  | agcttctggt | tggagaagat  | tgaagaaatg | 1200 |
| cttgaaaatg  | ctgaacggga  | acgtctgggt  | aattctcacc | agccagagaa  | gcctcttgta | 1260 |
| cgactgcgag  | tggactatag  | tggagggttt  | gaacctttca | gtgttcttcg  | ctttagccag | 1320 |
| aaatttgtgg  | atcgggtagc  | taatccaaaa  | gacattatcc | atttttttcag | gcatagagaa | 1380 |
| caaaaggaaa  | aaacaggaga  | agagatcaac  | tttgggaaac | ttatcacaaa  | gccttcagaa | 1440 |
| ggaacaactt  | taagggtaga  | agatcttgta  | aaacagtact | ttcaaaccgc  | agagaagaat | 1500 |
| gtgcagctct  | cactgctaac  | agaaagaggg  | atgggtgaag | cagtacaaga  | atthgtggac | 1560 |
| aaggaggaga  | aagatgccat  | tgaggaatta  | gtgaaatacc | agttggaaaa  | aacacagcga | 1620 |
| tttcttaaag  | aacgtcatat  | tgatgccctc  | gaagacaaaa | tcgatgagga  | ggtacgtcgt | 1680 |
| ttcagagaaa  | ccagacaaaa  | aaatactaata | gaagaagatg | atgaagtccg  | tgaggctatg | 1740 |
| accagggccca | gagcactcag  | atctcagtc   | gaggagtctg | cttctgcctt  | tagtgctgat | 1800 |
| gaccttatga  | gtatagattt  | agcagaacag  | atggctaata | actctgatga  | tagcatctca | 1860 |
| gcagcaacca  | acaaaggaag  | aggccgagga  | agaggtcgaa | gaggtggaag  | agggcagaat | 1920 |
| tcagcatcga  | gaggaggggtc | tcaaagagga  | agagccttta | aatctacaag  | acagcagcct | 1980 |
| tcccgaatg   | tactactaa   | gaattattca  | gaggtgattg | aggtagatga  | atcagatgtg | 2040 |
| gaagaagaca  | tttttcttac  |             |            |             |            | 2060 |

<210> 8  
 <211> 680  
 <212> PRT  
 <213> Homo sapiens

<400> 8

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ser | Thr | Ala | Asp | Ala | Leu | Asp | Asp | Glu | Asn | Thr | Phe | Lys | Ile | Leu |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Val | Ala | Thr | Asp | Ile | His | Leu | Gly | Phe | Met | Glu | Lys | Asp | Ala | Ala | Arg |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Gly | Asn | Asp | Thr | Phe | Val | Thr | Leu | Asp | Glu | Ile | Leu | Arg | Leu | Ala | Gln |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Glu | Asn | Glu | Val | Asp | Phe | Ile | Leu | Leu | Gly | Gly | Asp | Leu | Phe | His | Glu |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Asn | Lys | Pro | Ser | Arg | Lys | Thr | Leu | His | Thr | Cys | Leu | Glu | Leu | Leu | Arg |
| 65  |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |     |
| Lys | Tyr | Cys | Met | Gly | Asp | Arg | Pro | Val | Gln | Phe | Glu | Ile | Leu | Ser | Asp |
|     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |     |
| Gln | Ser | Val | Asn | Phe | Gly | Phe | Ser | Lys | Phe | Pro | Trp | Val | Asn | Tyr | Gln |
|     |     | 100 |     |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Asp | Gly | Asn | Leu | Asn | Ile | Ser | Ile | Pro | Val | Phe | Ser | Ile | His | Gly | Asn |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| His | Asp | Asp | Pro | Thr | Gly | Ala | Asp | Ala | Leu | Cys | Ala | Leu | Asp | Ile | Leu |
|     | 130 |     |     |     |     | 135 |     |     |     | 140 |     |     |     |     |     |
| Ser | Cys | Ala | Gly | Phe | Val | Asn | His | Phe | Gly | Arg | Ser | Met | Ser | Val | Glu |
| 145 |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |     |
| Lys | Ile | Asp | Ile | Ser | Pro | Val | Leu | Leu | Gln | Lys | Gly | Ser | Thr | Lys | Ile |
|     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |     |
| Ala | Leu | Tyr | Gly | Leu | Gly | Ser | Ile | Pro | Asp | Glu | Arg | Leu | Tyr | Arg | Met |
|     |     | 180 |     |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Phe | Val | Asn | Lys | Lys | Val | Thr | Met | Leu | Arg | Pro | Lys | Glu | Asp | Glu | Asn |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
| Ser | Trp | Phe | Asn | Leu | Phe | Val | Ile | His | Gln | Asn | Arg | Ser | Lys | His | Gly |
| 210 |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |     |     |
| Ser | Thr | Asn | Phe | Ile | Pro | Glu | Gln | Phe | Leu | Asp | Asp | Phe | Ile | Asp | Leu |
| 225 |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |     |
| Val | Ile | Trp | Gly | His | Glu | His | Glu | Cys | Lys | Ile | Ala | Pro | Thr | Lys | Asn |
|     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |     |
| Glu | Gln | Gln | Leu | Phe | Tyr | Ile | Ser | Gln | Pro | Gly | Ser | Ser | Val | Val | Thr |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|     | 260 |     | 265 |     | 270 |     |     |     |     |     |     |     |     |     |     |
| Ser | Leu | Ser | Pro | Gly | Glu | Ala | Val | Lys | Lys | His | Val | Gly | Leu | Leu | Arg |
|     | 275 |     |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| Ile | Lys | Gly | Arg | Lys | Met | Asn | Met | His | Lys | Ile | Pro | Leu | His | Thr | Val |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| Arg | Gln | Phe | Phe | Met | Glu | Asp | Ile | Val | Leu | Ala | Asn | His | Pro | Asp | Ile |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     | 320 |     |
| Phe | Asn | Pro | Asp | Asn | Pro | Lys | Val | Thr | Gln | Ala | Ile | Gln | Ser | Phe | Cys |
|     |     |     | 325 |     |     |     | 330 |     |     |     |     | 335 |     |     |     |
| Leu | Glu | Lys | Ile | Glu | Glu | Met | Leu | Glu | Asn | Ala | Glu | Arg | Glu | Arg | Leu |
|     | 340 |     |     |     |     |     | 345 |     |     |     | 350 |     |     |     |     |
| Gly | Asn | Ser | His | Gln | Pro | Glu | Lys | Pro | Leu | Val | Arg | Leu | Arg | Val | Asp |
|     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |     |
| Tyr | Ser | Gly | Gly | Phe | Glu | Pro | Phe | Ser | Val | Leu | Arg | Phe | Ser | Gln | Lys |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |
| Phe | Val | Asp | Arg | Val | Ala | Asn | Pro | Lys | Asp | Ile | Ile | His | Phe | Phe | Arg |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     | 400 |     |
| His | Arg | Glu | Gln | Lys | Glu | Lys | Thr | Gly | Glu | Glu | Ile | Asn | Phe | Gly | Lys |
|     |     |     | 405 |     |     |     |     | 410 |     |     |     |     | 415 |     |     |
| Leu | Ile | Thr | Lys | Pro | Ser | Glu | Gly | Thr | Thr | Leu | Arg | Val | Glu | Asp | Leu |
|     | 420 |     |     |     |     |     | 425 |     |     |     | 430 |     |     |     |     |
| Val | Lys | Gln | Tyr | Phe | Gln | Thr | Ala | Glu | Lys | Asn | Val | Gln | Leu | Ser | Leu |
|     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |     |
| Leu | Thr | Glu | Arg | Gly | Met | Gly | Glu | Ala | Val | Gln | Glu | Phe | Val | Asp | Lys |
| 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |     |
| Glu | Glu | Lys | Asp | Ala | Ile | Glu | Glu | Leu | Val | Lys | Tyr | Gln | Leu | Glu | Lys |
| 465 |     |     |     | 470 |     |     |     | 475 |     |     |     |     | 480 |     |     |
| Thr | Gln | Arg | Phe | Leu | Lys | Glu | Arg | His | Ile | Asp | Ala | Leu | Glu | Asp | Lys |
|     |     |     | 485 |     |     |     |     | 490 |     |     |     |     | 495 |     |     |
| Ile | Asp | Glu | Glu | Val | Arg | Arg | Phe | Arg | Glu | Thr | Arg | Gln | Lys | Asn | Thr |
|     | 500 |     |     |     |     |     | 505 |     |     |     |     | 510 |     |     |     |
| Asn | Glu | Glu | Asp | Asp | Glu | Val | Arg | Glu | Ala | Met | Thr | Arg | Ala | Arg | Ala |
|     | 515 |     |     |     |     | 520 |     |     |     |     | 525 |     |     |     |     |
| Leu | Arg | Ser | Gln | Ser | Glu | Glu | Ser | Ala | Ser | Ala | Phe | Ser | Ala | Asp | Asp |
|     | 530 |     |     |     |     | 535 |     |     |     |     | 540 |     |     |     |     |
| Leu | Met | Ser | Ile | Asp | Leu | Ala | Glu | Gln | Met | Ala | Asn | Asp | Ser | Asp | Asp |
| 545 |     |     |     | 550 |     |     |     | 555 |     |     |     |     | 560 |     |     |
| Ser | Ile | Ser | Ala | Ala | Thr | Asn | Lys | Gly | Arg | Gly | Arg | Gly | Arg | Gly | Arg |
|     |     |     | 565 |     |     |     |     | 570 |     |     |     |     | 575 |     |     |

Arg Gly Gly Arg Gly Gln Asn Ser Ala Ser Arg Gly Gly Ser Gln Arg  
 580 585 590  
 Gly Arg Ala Phe Lys Ser Thr Arg Gln Gln Pro Ser Arg Asn Val Thr  
 595 600 605  
 Thr Lys Asn Tyr Ser Glu Val Ile Glu Val Asp Glu Ser Asp Val Glu  
 610 615 620  
 Glu Asp Ile Phe Pro Thr Thr Ser Lys Thr Asp Gln Arg Trp Ser Ser  
 625 630 635 640  
 Thr Ser Ser Ser Lys Ile Met Ser Gln Ser Gln Val Ser Lys Gly Val  
 645 650 655  
 Asp Phe Glu Ser Ser Glu Asp Asp Asp Asp Asp Pro Phe Met Asn Thr  
 660 665 670  
 Ser Ser Leu Arg Arg Asn Arg Arg  
 675 680

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 <212> PRT  
 <213> Homo sapiens

<400> 9

Gln Pro Pro Gln Ile Glu Ser Phe Tyr Pro Pro Leu Asp Glu Pro Ser  
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 Ile Gly Ser Lys  
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<210> 10  
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 <213> Homo sapiens

<400> 10

Leu Ser Ser Ala Val Val Phe Gly Gly Gly Glu Ala Arg  
 1 5 10

<210> 11  
 <211> 11  
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<400> 11

Trp Ile Gln Ser Ile Met Asp Met Leu Gln Arg  
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<211> 21

<212> PRT

<213> Homo sapiens

<400> 12

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Phe Met Thr Thr Lys  
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<211> 17

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<213> Homo sapiens

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Lys

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<213> Homo sapiens

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<211> 9

<212> PRT

<213> Homo sapiens

<400> 17

Asn Tyr Phe Gln Pro Ser Thr Lys Lys  
1 5

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<211> 27

<212> PRT

<213> Homo sapiens

<400> 18

Asn Lys Glu Gln His Leu Ser Glu Asn Glu Pro Val Asp Thr Asn Ser  
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Asp Asn Asn Leu Phe Thr Asp Thr Asp Leu Lys  
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<211> 17

<212> PRT

<213> Homo sapiens

<400> 19

Glu Met Asp Asp Val Ala Ile Glu Asp Glu Val Leu Glu Gln Leu Phe  
 1 5 10 15  
 Lys

<210> 20  
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 1 5 10 15  
 Ser Ser Lys

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 1 5

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<400> 23

Asn Pro Ser Gly Ile Asn Asp Asp Tyr Gly Gln Leu Lys  
1 5 10

<210> 24

<211> 10

<212> PRT

<213> Homo sapiens

<400> 24

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